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Tree Farm Licence 48

Canadian Forest Products Ltd

Rationale for Allowable Annual Cut (AAC) Determination

Effective September 20, 2001

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Deputy Chief Forester

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Objective of this Document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence (TFL) 48. This document also identifies where new or better information is needed for incorporation in future determinations.

Description of the TFL

TFL 48, also known as the Chetwynd TFL, is held by Canadian Forest Products Ltd. (Canfor or "the licensee") and consists of five supply blocks in the western half of the British Columbia Forest Service (BCFS) Dawson Creek Forest District in the Prince George Forest Region. The blocks are clustered around the communities of Chetwynd and Tumbler Ridge, which lie to the west and southwest, respectively, of Dawson Creek. For the most part, the blocks border the Dawson Creek Timber Supply Area (TSA), but they also share boundaries with the Mackenzie, Fort St. John, and Prince George TSAs. Of the total TFL area, 84 percent overlaps with the operating area of Pulpwood Agreement (PA) 13, issued to Louisiana-Pacific Canada Ltd. (Louisiana-Pacific).

The northeastern part of the TFL is characterized by flat or gently rolling terrain, while the southern and western parts, which lie within the lee of the Rocky Mountains, are more rugged. The TFL lies within the Engelmann Spruce-Subalpine Fir (ESSF), Sub-Boreal Spruce (SBS), Boreal White and Black Spruce (BWBS), and Alpine Tundra (AT) biogeoclimatic zones.

This diversity of terrain and climate has led to considerable variation in tree species and productivity. The principal commercial species are white spruce and aspen in the northeast; and white spruce, lodgepole pine, subalpine fir, aspen, and cottonwood in the mountainous areas to the west and south.

Local communities include Chetwynd, Tumbler Ridge, Hudson's Hope, Moberly Lake and Saulteau. Of these, Chetwynd, the site of Canfor's sawmill, is the most economically dependent upon harvesting operations in TFL 48. Other economic activities in the area include oil and gas exploration and development, mining, hydro-electric power generation, agriculture, trapping, guide outfitting, and outdoor recreation.

The total land base of TFL 48 is 643 511 hectares, of which 570 744 hectares (89 percent) are covered by productive forest. The other 72 767 hectares (11 percent) are composed largely of alpine tundra, icefields, rock, lakes, swamp, and existing roads. In the base case, 307 829 hectares (54 percent) of the total productive land base were estimated to contribute to the long-term timber harvesting land base.

History of the AAC

Prior to 1988, the licensee held a forest licence under which it operated in much of the area now covered by TFL 48. In 1988, the forest licence was replaced with a TFL with an associated AAC of 410 000 cubic metres.

The AAC was increased to 514 000 cubic metres, effective December 31, 1996. Of this total, 460 000 cubic metres were attributed to the volume of coniferous and deciduous trees in coniferous-leading stands. The balance of 54 000 cubic metres is attributed to the volume of deciduous and coniferous trees in deciduous-leading stands.

The increase in AAC was largely attributable to the inclusion in the timber harvesting land base of substantial areas of stands previously classified as unmerchantable. The Small Business Forest Enterprise Program (SBFEP) is allocated 58 630 m3 of the AAC.

New AAC determination

Effective September 20, 2001 the new AAC for TFL 48 will be 580 000 cubic metres, which represents an increase of 66 000 cubic metres (or 11 percent) from the current AAC. I attribute, under section 8(5) of the *Forest Act*, 55 000 cubic metres to deciduous and coniferous trees within deciduous-leading stands, and the balance to coniferous and deciduous trees within coniferous-leading stands.

This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination.

Information sources used in the AAC determination

- Existing stand yield tables for TFL 48, approved by British Columbia Forest Service (BCFS) Resources Inventory Branch, February 14, 2001;
- Managed stand yield tables and site index curves, approved by BCFS Research Branch, February 12, 2001;
- *Timber Supply Analysis Information Package*: *TFL 48*, Management Plan No. 3, Canadian Forest Products Ltd., accepted February 15, 2001;
- *Timber Supply Analysis Report: TFL 48*, Management Plan No. 3, Canadian Forest Products Ltd. accepted July 16, 2001;
- *TFL 48, Twenty-Year Plan*, Canadian Forest Products Ltd., accepted July 23, 2001;
- *Proposed Management Plan No. 3: TFL 48*, Canadian Forest Products Ltd., dated June 14, 2001;
- *Site index Adjustments for Old-growth Stands based on Paired Plots*, BCFS Research Branch, 1998;
- *Site index Adjustments for Old-growth Stands based on Veteran Trees*, BCFS Research Branch, 1998;
- *TFL 48 Rationale for AAC determination*, Chief Forester, December 31, 1996;

- Letter from the Minister of Forests to the Chief Forester, dated July 28, 1994, stating the Crown's economic and social objectives;
- Memorandum from the Minister of Forests to the Chief Forester, dated February 26, 1996, stating the Crown's economic and social objectives with regard to visual resources;
- Letter from the Deputy Ministers of Forests, and Environment, Lands and Parks, dated August 25, 1997, conveying government's objectives regarding the achievement of acceptable impacts of biodiversity management on timber supply;
- Memorandum from the Director of the Timber Supply Branch of the Ministry of Forests, dated December 1, 1997, titled *Incorporating Biodiversity and Landscape Units in the Timber Supply Review*;
- *Forest Practices Code of British Columbia Act*, consolidated to March 2001;
- *Forest Practices Code of British Columbia Act Regulations and Amendments*, current as of March 2001;
- *Forest Practices Code of British Columbia Guidebooks*, BCFS and MELP;
- *Identified Wildlife Management Strategy*, February 1999;
- *Higher Level Plans: Policy and Procedures*, BCFS and MELP, December 1996;
- *Landscape Unit Planning Guide*, Province of British Columbia (B.C.), March 1999;
- *Dawson Creek Land and Resource Management Plan*, March 30, 1999; and
- Technical review and evaluation of current operating conditions through comprehensive discussions with staff of the BCFS and Ministry of Water, Land and Air Protection (MWLAP), including the AAC determination meeting held in Victoria, June 13, 2001.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are necessarily simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variations in physical, biological, and social conditions, although ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural, and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily

provide complete answers or solutions to forest management problems such as AAC determinations. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for TFL 48, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for TSAs and TFLs. Section 8 is reproduced in full as Appendix 1.

In accordance with Section 23(3) of the *Interpretation Act*, the deputy chief forester is expressly authorized to carry out the functions of the chief forester, which include those required under Section 8 of the *Forest Act*.

The chief forester has expressed the importance of consistency of judgment in making AAC determinations. I also recognize the need for consistency of approach. I have observed the chief forester during a number of previous AAC determinations and am familiar with the guiding principles that the chief forester has employed in making AAC determinations. I find these principles to be reasonable and appropriate and I have adopted them as described below in making my AAC determination for TFL 48.

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. When a large number of determinations are made for many forest management units over extended periods of time, administrative fairness requires a reasonable degree of consistency of approach in incorporating these changes and uncertainty. To make his approach in these matters explicit, the chief forester has compiled a set of guiding principles for AAC determinations. I have reviewed these principles and find them to be reasonable, and thus I have adopted and applied them as deputy chief forester in AAC determinations for TFLs. These principles are set out below. If in some specific circumstance it may be necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, to ensure they incorporate current information and knowledge, a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires the chief forester to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation of current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to increase the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest Practices Code of British Columbia Act* and its associated regulations (the Forest Practices Code).

The *Forest Practices Code of British Columbia Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995.

Although implementation of the Forest Practices Code has been underway since the end of the transition period on June 15, 1997, the timber supply implications of some of its provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination the chief forester takes this uncertainty into account to the extent possible in the context of the best available information. In making my determination for TFL 48, as deputy chief forester, I have followed the same approach.

As British Columbia progresses toward completion of strategic land use plans, the eventual timber supply impacts associated with the land-use decisions resulting from the various planning processes—including the Commission on Resources and Environment (CORE) process for regional plans, the Protected Areas Strategy (PAS) and the Land and Resource Management Planning (LRMP) process—are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be the position of the chief forester that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions that have not yet been taken by government. I consider this approach to be reasonable and appropriate. Like the chief forester, therefore, I will not take into account the possible impacts of existing or anticipated recommendations made by such planning processes, nor attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impact in a current AAC determination. In many cases, government's land-use decision must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five–year AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

However, where specific protected areas have been designated by legislation or by order in council, these areas are no longer considered to contribute to the timber supply in AAC determinations.

For TFL 48, government's approval of the Dawson Creek Land and Resource Management Plan (DCLRMP) in 1999, and decisions on protected areas have clarified many aspects of land and resource use and management.

Forest Renewal British Columbia funds a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long term. As with all components of an AAC determination, like the chief forester, I require sound evidence before accounting for the effects of intensive silviculture on possible harvest levels. Nonetheless, I will consider information on the types and extent of planned and implemented practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine many outdated AACs in the province between 1992 and 1996. In any case, the data and models available today are improved from those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, the chief forester should immediately reduce some AACs in the interest of caution. However, any AAC determination made by the chief forester or myself must be the result of applying our individual judgment to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from court decisions in recent years, including those in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting those obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within TFL 48.

With respect to future treaty decisions, as with other land-use decisions it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result from decisions that have not yet been taken by government.

Overall, in making this AAC determination, as the deputy chief forester, I am mindful of the chief forester's obligation as steward of the forest land of British Columbia, of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act*, and of the chief forester's responsibilities under the *Forest Practices Code of British Columbia Act*.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs.

For each AAC determination for a TFL, a timber supply analysis is carried out using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model, a series of timber supply forecasts is produced, reflecting different starting harvest levels, rates of change over time, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen that attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. This is known as the 'base case' forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TFL is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it. In some cases, an AAC is determined that coincides with the base case starting point. In other cases, an AAC is determined which differs significantly from the modelled starting point.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which I believe the assumptions made in generating the base case forecast are accurate, current, and complete and the degree to which I believe the base case predictions of timber supply should be adjusted.

Adjustments are made on the basis of informed judgment, using current available information about forest management, which may have changed since the original information package was assembled. Forest management data are particularly subject to change during periods of legislative or regulatory change, such as the enactment of the Forest Practices Code, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but rather is a synthesis of judgment and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. Judgments that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional

precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

Timber supply analysis

The timber supply analysis for TFL 48 was prepared by Industrial Forestry Service Limited (IFS), under the direction of licensee staff. The BCFS computer simulation model Forest Service Simulator (FSSIM) (version 3) was used to conduct the analysis. Given that this model is used by the BCFS during its timber supply analyses, and based on my staff's experience examining results from this model, I am satisfied that it is capable of providing a reasonable projection of timber supply.

The base case prepared on behalf of the licensee projected an initial harvest level of 581 300 cubic metres per year, with 528 000 cubic metres per year attributable to volumes from coniferous-leading stands and the remainder of 53 000 cubic metres per year attributable to deciduous-leading stands. This is higher than the current AAC of 514 000 cubic metres of which 460 000 cubic metres is attributable to conifers and 54 000 cubic metres is attributable to deciduous. The initial harvest level was maintained in the base case for 18 decades and then increased to 597 900 cubic metres per year for the remainder of the 400 year timber supply planning period.

In the timber supply analysis, various sensitivity analyses were conducted to assess the potential implications for timber supply arising from uncertainty in data assumptions and estimates. These sensitivity analyses have also assisted me in considering the factors leading to my determination.

As discussed throughout this rationale, and in consideration of the items described above, I am satisfied that the information presented to me provides an adequate basis from which I can assess the timber supply for TFL 48 for this determination.

Consideration of Factors as Required by Section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

Land base contributing to timber harvesting

- general comments

The total area of TFL 48, as estimated from the licensee's inventory file, is 643 511 hectares. Eighty nine percent of this area is considered to be productive forest land. The total area of TFL 48 has changed since MP No. 2 due to the addition of the 5747-hectare Rice property, which was purchased by the licensee in 1999, exclusion of the areas included in woodlots that have been issued since the 1996 AAC determination, and reconciliation of TFL boundaries to TRIM NAD 83 base.

As part of the process used to define the timber harvesting land base in the timber supply analysis, a series of deductions are made from the productive forest land base. These deductions account for the factors that effectively reduce the suitability or availability of the productive forest area for harvest, for ecological, economic or social (e.g. parks) reasons. For TFL 48 these reductions result in a short-term timber harvesting land base of 321 579 hectares, or approximately 56 percent of the productive forest land and a long-term timber harvesting land base of 307 829 hectares, or approximately 48 percent of the productive forest land.

In my determination I have considered all of the deductions applied in the derivation of the timber harvesting land base.

In this document I have not included a detailed discussion of the deductions for non-productive and non-forested areas; natural disturbance type (NDT) 5 stands, and the Quintette mine site. Based on my review I accept these as modelled.

Where my consideration of the information has identified a factor for which I believe an adjustment is required, or the factor otherwise in my estimation requires discussion in this document, I have described it below.

- economic and physical operability

In a timber supply analysis, the portions of a forest management unit that are not physically accessible for harvesting, or where harvesting appears to be uneconomical, are categorized as inoperable and are excluded when deriving the timber harvesting land base.

In the case of TFL 48, the licensee reassessed the land base for physical operability during the term of MP No. 2. It used the recently completed terrain mapping and landslide inventory, along with vegetative cover information and the TRIM digital elevation model to classify the area by "stability index". Stands were then classified by physical operability class depending on their slope and stability index. Unstable areas, as well as areas with a slope exceeding 70 percent were classified as inoperable. Within the operable areas of the TFL the licensee classified areas as harvestable using conventional harvest systems, mixed harvest systems, or cable-helicopter systems, depending on the physical operability class.

In the base case a total of 34 749 hectares, which is 6.1 percent of the productive forest area, were excluded from the timber harvesting land base as physically inoperable.

I have reviewed and discussed with BCFS staff the information concerning the area excluded as inoperable and the classification of the operable area by harvest system. I find the method used reasonable and I accept the resulting information as the best available and suitable for use in this determination.

- roads, trails, and landings

In the timber supply analysis, a percentage of the productive forest was excluded from the timber harvesting land base to account for the losses resulting from the construction of roads, trails, and landings. Separate estimates were made for existing and for future

roads, trails, and landings, to reflect both current access and anticipated road network requirements over time.

1) existing roads, trails and landings

To account for existing classified and unclassified roads, trails, and landings in the derivation of the timber harvesting land base, the licensee deducted 6188 hectares from the total area of the TFL.

Classified roads, trails, and landings are identified in the licensee's Geographic Information System (GIS) as polygons and the total area to be excluded (4098 hectares) was derived by summing the area of each of these polygons. To estimate the area occupied by existing unclassified roads, trails, and landings, the licensee used the road line features in its GIS database. The line features were classified into five categories ranging from paved highways with a width of 50 metres to permanent in-block roads with a width of 8 metres. The licensee assumed that landings and trails were accounted for in the buffer widths applied. The resulting area reduction for unclassified roads, trails, and landings was 2090 hectares.

To account for all existing seismic lines, pipelines, exploration access trails, and transmission lines, the licensee excluded 2636 hectares of productive forest from the timber harvesting land base.

2) future roads, trails and landings

Canfor reviewed its 1993 – 1997 forest development plan (FDP) maps to predict the additional area that would be required in the future for landings, operational roads, and cutblock roads with no planned rehabilitation. The licensee also estimated the general location of, and area needed for, future Forest Service road construction. Future losses due to highways, seismic lines, railways, and transmission corridors were estimated assuming historical activity would be continued at similar levels. Based upon the total of these areas the licensee determined that 4.9 percent of the current unmanaged stands in the timber harvesting land base would be lost and unsuitable for future timber production. In total 13 750 hectares of potentially productive land were excluded from the timber harvesting land base on this account.

I have reviewed and discussed the information regarding existing and future roads, trails, and landings with BCFS district staff and I accept the assumptions used to estimate existing roads, trails and landings as the best available information. I also accept the assumptions used to calculate deductions for future roads, trails and landings. While I acknowledge that the licensee's estimates are based on a detailed and thorough review of current and future requirements, I consider it important for the licensee to track and quantify the impact of energy exploration and development on the forest land base over the next 5 years. For the next timber supply analysis, I request that the licensee track the area denuded for these activities in order to determine if there is a trend in the rate of denudation and to assess if any of these areas will contribute to future timber supply

- protected areas

TFL 48 lies entirely within the area covered by the Dawson Creek Land and Resource Management Plan (DCLRMP), which received government approval on March 30, 1999. The DCLRMP proposed six proteced areas of which all but the Peace/Boudreau protected area were recently established by order-in-council.

The licensee excluded 14 904 hectares of productive forest land, including 2099 hectares within the Peace/Boudreau proposed protected area, from the timber harvesting land base.

I have reviewed and discussed the information regarding protected areas with BCFS staff and I note that area excluded from the timber harvesting land base to account for protected areas included the Peace/Boudreau proposed protected area, which has not been legally established by government. As discussed in my "Guiding principles", in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions that have not yet been taken by government. At this time I cannot assume that the Peace/Boudreau area will be designated as a protected area. I therefore conclude that the timber harvesting land base assumed in the base case has, at this point in time, been underestimated by 2099 hectares. Including this area in the timber harvesting land base results in a small increase (less than 1 percent) in the long-term timber supply for TFL 48 and I will discuss this further in my "Reasons for decision".

- environmentally sensitive areas

An environmentally sensitive area (ESA) is an area identified during a forest inventory that is particularly sensitive to disturbance and/or is significantly valuable for resources other than timber. ESA information was originally used to identify areas to exclude in deriving the timber harvesting land base where more specific or detailed information was not available about a particular forest resource.

During the term of MP No. 2 Canfor conducted various new resource inventories and I will discuss these in the applicable sections.

- sites with low timber growing potential

To identify areas considered to be unharvestable because of their low timber growing potential, Canfor assumed that in order to harvest a stand, at the regional priority cutting age (101 years for lodgepole pine, 141 years for spruce, 121 years for balsam and 81 years for aspen and cottonwood) a certain minimum volume per hectare would be necessary for each operability type (120 cubic metres per hectare for conventional, 150 cubic metres per hectare for mixed and 200 cubic metres per hectare for cable/aerial). Canfor then derived the site index required to achieve this specified tree volume by cutting age using the variable density yield prediction (VDYP) model (version 6.6d). All the areas with a lower site index were then excluded from the timber harvesting land base. A total of 53 051 hectares were excluded after other previous reductions.

For deciduous stands, in addition to using the derived site index to identify low site areas, Canfor assumed that deciduous stands with a higher site index should only be included in the timber harvesting land base if they could be logged conventionally. In the base case

these conventionally logged deciduous-leading stands have an average projected harvest age of 140 years over the next 10 decades. Both BCFS district and licensee staff agree that this appears to be unrealistically old, based on their experience in the unit. However, there is little harvest history in deciduous stands on the TFL and the site indices for aspen and cottonwood are subject to considerable uncertainty.

Having reviewed the information provided, I accept the assumptions regarding the exclusion of sites with low timber growing potential as reasonable. I note, however, that the area excluded for deciduous leading stands may be too large due to the high minimum site indices used – higher than those used for the Dawson Creek Timber Supply Area analysis. I therefore request that, in preparation for the next timber supply analysis, the licensee monitor harvesting performance in deciduous-leading stands which are currently classified as having low timber growing potential.

- problem forest types

In the timber supply analysis, several classes of stands were excluded from the timber harvesting land base to account for stands that are currently uneconomic to harvest due their excessive age, low height, very low or very high stocking density, or low volume. Areas growing species that are currently unmerchantable, such as black spruce, and areas for which no species labels are available in the inventory, were also excluded from the timber harvesting land base. In addition, deciduous-leading stands that are operable using cable and mixed harvesting methods, as well as all deciduous-leading stands in the ESSF biogeoclimatic zone were excluded from the timber harvesting land base.

On this basis, a total of 96 995 hectares of mature stand problem forest types were excluded from the timber harvesting land base.

BCFS district staff indicate that the assumptions regarding problem forest types are representative of current practice.

I have reviewed and discussed the information regarding problem forest types with BCFS staff and I am satisfied that the assumptions on which the timber supply analysis was based are adequate for use in this determination. For the next determination, I encourage the licensee to classify the areas that do not currently have an inventory species label.

- Rice properties

In October 1999, the licensee purchased the 5747-hectare Rice properties and added these areas to TFL 48. According to the licensee, it has been converting the marginal agricultural land, immature deciduous stands, and previously logged coniferous sites on the Rice properties to productive conifer-leading stands. In its proposed MP No. 3, the licensee indicates that continued conversion of the Rice properties is dependent upon outside funding.

In its base case, the licensee assumed that the Rice properties would be converted to coniferous stands within 5 years; therefore, the entire 5747 hectares were included in the timber harvesting land base. The licensee estimates that coniferous stands on the Rice properties contribute approximately 15 000 to 20 000 cubic metres per year to the timber supply projected in the base case.

BCFS district staff indicate that, as of May 2001, 50 percent of the deciduous stand conversion is complete, insofar as brushing and shearing are concerned. Silvicultural prescriptions have been approved for the remaining deciduous stands. The conversion of agricultural areas has not started. District staff also note that the success of the conversion treatments is somewhat uncertain due to the risk of bluejoint grass (*Calamagrotis canadenis*) competition and potentially dense deciduous regeneration after aspen shearing.

I have reviewed and discussed the information regarding the Rice properties with BCFS staff and I conclude that there is some uncertainty regarding the final contribution that the Rice properties will make to the long-term timber supply. Nevertheless, I conclude that the assumptions used in the base case are a reasonable extrapolation of the treatments to date.

In view of the uncertainty expressed by district staff regarding the potential difficulties that may be encountered in the conversion of deciduous stands on the Rice properties, I request that the licensee monitor its success in attaining the desired regeneration and growth of conifers and provide relevant data for the next AAC determination.

- deciduous

Within the current AAC, 54 000 cubic metres are attributable to deciduous and coniferous trees within deciduous-leading stands and 460 000 cubic metres are attributable to coniferous and deciduous trees within coniferous-leading stands. As the holder of pulpwood agreement 13 (PA 13), which overlaps 84% of the total TFL 48 area, Louisiana-Pacific currently has access to the deciduous partition. Canfor does not currently harvest deciduous-leading stands or have facilities to process deciduous tree species.

To reflect current management practices in the base case, the licensee included deciduous stands in the timber harvesting land base if they were:

- inside the PA 13 boundary;
- outside the PA 13 boundary but within the Rice properties where they will be converted to conifer stands; and
- in all cases, not in the ESSF biogeoclimatic zone.

The total area of deciduous stands included in the timber harvesting land base, as modelled in the base case, is 40 774 hectares, which is 12.7 percent of the total timber harvesting land base.

A sensitivity analysis tested the impact on timber supply of including all deciduous-leading stands, other than those in the ESSF, in the timber harvesting land base. The result was a 4900- cubic metre per year increase (9.2 percent) in the deciduous timber supply relative to the base case.

According to BCFS district staff the assumed timber harvesting land base contains approximately 14 000 hectares of deciduous-leading stands that are at least 100 years old. Based upon the rate of harvest of these stands in the base case it will take 46 years to harvest them all. Although the stand dynamics of deciduous-leading stands on the TFL is not clearly understood, I am mindful of the risk associated with not utilizing the mature

deciduous-leading stands before they decay and I will discuss this in my "Reasons for decision".

I have considered the information presented to me regarding deciduous trees on TFL 48 and conclude that, for the purposes of this analysis, it was not appropriate to exclude deciduous stands outside of the area of PA 13. To the extent those stands are similar to deciduous stands within the boundaries of PA 13, which are being harvested, they should be considered harvestable. Therefore, I conclude that the deciduous timber supply has been underestimated in the base case by 4900 cubic metres per year across the entire forecast period and I have accounted for this in my determination, as discussed in "Reasons for decision".

Existing forest inventory

- general comments

In response to the chief forester's instruction in the rationale for his 1996 AAC determination, the licensee completed Phase I of a Vegetation Resources Inventory (VRI) for TFL 48, in which the area was classified using photo-interpretation. The aerial photography was taken in 1993/94 for blocks 4 and 5, and in 1997 for blocks 1, 2, and 3. Phase II of the VRI, which consists of ground sampling aimed at verifying or adjusting the photo-interpreted attributes in the inventory, was initiated in spring 2001 and has yet to be completed.

Canfor uses an ARCINFO Geographic Information System (GIS) to complete annual updates of the inventory. For this timber supply analysis, the forest cover inventory has been updated for harvesting and silviculture surveys completed up to March 2000.

The inventory information indicates that of the stands that contribute to the timber harvesting land base, 52 percent are classified as old growth or mature and 15 percent are within 20 years of their minimum harvestable age.

I have reviewed and discussed the inventory information with BCFS staff and I am satisfied that the new VRI inventory is currently the best available information for this determination and any adjustments to this inventory that result from the completion of Phase II can be accounted for in the next determination. Furthermore, I note that a substantial percentage of the stands in the TFL are above or near their minimum harvestable ages, which indicates that there is a great deal of flexibility in the timber supply for this management unit.

- volume estimates for existing stands

Yield tables for natural stands, including young stands without a harvest history, were generated using VDYP (6.6d). Standard Ministry of Forests utilization levels were assumed and local Ministry of Forests decay waste and breakage factors were used. To reflect the current practice of leaving deciduous stems standing in the ESSF biogeoclimatic zone, deciduous volumes were excluded from the yield tables representing conifer leading stands in that biogeoclimatic zone.

For this determination, I accept the existing stand yield tables as being based upon the best available information and expect the completion of VRI phase II will ensure better stand volume estimates are available for the next determination.

Expected rate of growth

I have considered the information regarding the procedures used for aggregating individual stands into analysis units and the volume estimates for managed stands, including the operational adjustment factors.

- site productivity estimates

Inventory data includes estimates of site productivity for each forest stand, expressed in terms of a site index. The site index is based on the stand's height as a function of its age. The productivity of a site largely determines how quickly trees grow. This in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, and the ages at which a stand will satisfy mature forest cover requirements and reach a merchantable size.

In general, in British Columbia, it has been found that site indices determined from younger stands (i.e., less than 31 years old), and older stands (i.e., over 150 years old) may not accurately reflect potential site productivity. In young stands, growth often depends as much on recent weather, stocking density and competition from other vegetation, as it does on site quality. In old stands, which have not been subject to management of stocking density, the trees used to measure site productivity may have grown under intense competition or may have been damaged, and therefore may not reflect the true growing potential of the site.

This has been verified in several areas of the province where studies—such as the Old-Growth Site Index (OGSI) 'paired plot' project and the 'veteran' study—as well as results from using the Site Index Biogeoclimatic Ecosystem Classification System (SIBEC) suggest that actual site indices may be higher than those indicated by existing data from old-growth forests. In recent years it has been concluded from such studies that site productivity has generally been underestimated by older inventories; managed stands tend to grow faster than projected by inventory-based site index estimates from old-growth stands.

In the base case, site indices for existing natural stands were assigned using VDYP. Site indices for existing managed stands were assigned on the basis of silviculture surveys or SIBEC information, or where available, growth intercept methods. For areas classified as "current not-satisfactorily-restocked (NSR)" (see *not-satisfactorily-restocked areas*), site indices were assigned using SIBEC information.

In areas where the licensee anticipates using the irregular shelterwood silvicultural system, the site index of the most productive layer was assigned to the entire stand. OGSI adjustments were not applied to site indices assumed in the base case.

The licensee provided a sensitivity analysis to test the impact on timber supply of applying OGSI adjustments to the base case site indices. The adjustments resulted in an increase in the average area-weighted site index for all stands from 13.6 metres to 16.2 metres at age 50 years and a 30 percent increase in the initial flat-line harvest level.

The licensee has recently completed a combination of terrestrial ecosystem mapping (TEM) and predictive ecosystem mapping (PEM) for the TFL. In its proposed Management Plan No. 3 the licensee indicated that it intends to gather data for estimating local site index values.

I expect that localized information obtained for TFL 48 will indicate that the site productivity assumed in the base case underestimates actual productivity. Considering the potentially significant impacts on timber supply as indicated in the sensitivity analysis, I encourage the licensee to obtain better site productivity information for the next timber supply review.

For this determination, I will take into account the potential upward influence of improved site productivity estimates on timber supply, and will discuss this further in my 'Reasons for decision'.

- minimum harvestable ages

In timber supply analysis, estimates are made of the earliest age at which a forest stand has reached a harvestable condition or has met minimum merchantability criteria. These assumptions largely affect when second growth stands will be available for harvest in the model. In practice, many forest stands will be harvested later than the age at which they reach minimum merchantability, due to economic considerations and constraints on harvesting that arise from managing for other forest values such as visual quality, wildlife, and water quality.

For TFL 48 the minimum harvestable age was set at the regional priority cutting age for existing unmanaged stands, and culmination age (maximum mean annual increment) for managed stands. Regional priority cutting ages are 81 years for deciduous tree species, 101 years for lodgepole pine, 121 years for balsam fir, and 141 years for white spruce.

Canfor conducted two sensitivity analyses to investigate the impact on timber supply of changing minimum harvestable age for existing unmanaged stands:

- reduce the minimum harvest age (based on regional priority cutting ages) by 10 years, and
- use culmination age as minimum harvest age.

The impact of the 10-year reduction was a 4.3 percent increase in timber supply. Changing to culmination age increased the timber supply by 2.6 percent.

I acknowledge that, due to the robust supply of mature timber (see *existing forest inventory*), there is no pressure in the near term to lower the minimum harvest ages significantly. In the long term it is reasonable to decrease harvesting ages and thereby increase yields. I accept the assumptions regarding minimum harvestable age as appropriate for use in this determination.

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

Expected time for the forest to be re-established following harvest

I have reviewed the information regarding regeneration delay and I am satisfied that the assumptions used in the analysis for this factor were appropriate. I will not discuss these further in this rationale.

- not-satisfactorily-restocked (NSR) areas

Not-satisfactorily-restocked (NSR) areas are those areas where timber has been removed, either by harvesting or by natural causes, and a stand of suitable trees and stocking has yet to be established. Where a suitable stand has not been regenerated and the site was harvested prior to 1987, the classification is 'backlog' NSR. All other NSR is considered 'current' NSR.

For this analysis, Canfor identified 4828 hectares of NSR area within the timber harvesting land base of which 2174 hectares are classified as current NSR. As a result of Canfor's reforestation activities, natural reforestation, re- inventory and the institution of the licensee's silviculture tracking inventory during MP No. 2, the area identified as backlog NSR decreased from 13 063 ha reported in MP No. 2 to 2654 hectares in MP No. 3. Of the remaining backlog NSR, 2403 hectares originated prior to 1982 and the licensee has committed in its proposed MP No. 3 to regenerate these areas. The remaining 251 hectares of backlog NSR that originated between 1982 and 1987 was assumed to be regenerated by the BCFS.

In the base case current NSR was assumed to regenerate within two years and all backlog NSR was assumed to be regenerated during the first decade.

BCFS staff indicate that they have not yet reviewed and confirmed the information from the licensee's tracking system. Furthermore, they note that a direct comparison of the NSR area as identified in MP No. 3 with the area previously identified in MP No. 2 is difficult due to the change in inventory methodology.

I acknowledge that relative to MP No. 2, the area classified as backlog NSR has dramatically decreased. I also note that any perceived uncertainty in the area reported as being NSR will be reduced when district staff have had the opportunity to review the information in the licensee's tracking system. For this determination I accept the information used in the base case as the best available information. I request that for the next determination the licensee work with district staff to confirm the area of NSR.

(iii) silviculture treatments to be applied to the area,

Silvicultural treatments to be applied

I have reviewed the information regarding commercial thinning and incremental silviculture, and I am satisfied that the base case assumptions for these factors were appropriate.

- silvicultural systems

Clear cutting is the main silvicultural system used on TFL 48, and having reviewed and discussed the assumptions used in the base case to model this system, I am satisfied that the best available information was used for this determination.

The irregular shelterwood silvicultural system is also practiced on approximately 6.4% of the TFL 48 timber harvesting land base. Historic regeneration problems in the uneven-aged (two-layered) stands of the ESSF and SBS have prompted the use of this silvicultural system. In the base case, different assumptions were used to model shelterwoods in balsam-leading stands and spruce-leading uneven-aged stands.

In practice, prior to harvest the top layer of these stands is typically over 200 years old, and the lower layer is 25 to 70 years old. Canfor removes the overstory, often leaving a residual balsam understory of advance regeneration. The trail system used to access the area for harvesting covers approximately 40 – 50 percent of the harvested area and is planted with spruce seedlings at a density of 1600 stems per hectare.

In the base case, the licensee assumed that when first harvested, 90 percent of the existing volume was removed. Following harvest, it was assumed that 45 percent of the area was occupied by the trail system and regeneration of this area was modelled using TIPSY generated managed stand yield tables reduced by 5% to account for shading. The remaining 55% of the area was assumed to be covered with a residual stand aged 65 years. Growth of the residual stands was projected using VDYP. Research Branch staff accepted the methods used for modelling the irregular shelterwood silvicultural systems.

Canfor has been installing growth and yield plots in these shelterwood sites in order to provide more refined yield estimates for these stands in the future.

I reviewed and discussed the information regarding shelterwood silvicultural systems with BCFS staff. I find the assumptions used in the base case satisfactorily reflect current performance and are suitable for use in this determination.

I commend the licensee's commitment to monitor the productivity of the irregular shelterwoods on TFL 48 and I encourage it to monitor the impact on the planted spruce and the productivity of the residual strips of advanced regeneration.

- regeneration assumptions

To reflect the less intensive management regimes practiced on TFL 48 prior to 1995, in the base case the licensee assumed different regimes for stands harvested before and after 1995. Conifer stands harvested since 1995, including the trails within the area managed using the irregular shelterwood silvicultural system, were assumed to be planted at a density of 1600 stems per hectare. Growth of these planted stands was projected using TIPSY. Conifer stands harvested prior to 1995 were assumed to have been restocked using a combination of natural regeneration and planting, with longer regeneration delays and reduced stocking. Growth of these stands was also modelled using TIPSY.

Regenerating deciduous stands were assumed to be naturally established with a density of 5000 stems per hectare. Deciduous regeneration was modeled using VDYP. Other than the Rice property, pure or mixed deciduous stands were assumed to regenerate at the

original species composition for the analysis unit with the growth in mixed-wood stands of deciduous species being modelled using VDYP and conifer species using TIPSY. Pure and mixed deciduous stands on the Rice property were assumed to be converted to 60% white spruce and 40% lodgepole pine.

BCFS district staff indicated that the management of mixed wood stands is currently under review. Generally the expectation is that the proportion of forest types in each landscape unit will be maintained over time.

I have reviewed and discussed with district staff the regeneration assumptions applied in the base case. I accept them as a reasonable approximation of current performance and suitable for use in this determination.

- select seed

The Forest Practices Code requires the use of the best genetic quality (seed and vegetative material) source available for regeneration. Select seed produced from seed orchards is the product of British Columbia's forest gene resource management program, which uses traditional tree breeding techniques to select naturally-occurring, well-adapted, healthy, and vigorous trees.

Select seed produces trees that grow faster than trees that germinated from natural stand seed for a specific time, which varies by species and site. As a result, a stand that originates from select seed has a greater volume at the same age than a natural stand with the same species composition. Current expectations are that the volume differences will begin to decrease beyond a certain stand age.

According to the licensee, it has recently begun using class "A" hybrid spruce seed for reforestation and, in 2000, the licensee planted 300 000 class "A" spruce seedlings on TFL 48.

In view of the short history of use of select-seed seedlings on the TFL, the licensee indicates that there has been insufficient time to assess the performance of these seedlings. Therefore, increases in stand yields due to the use of select seed were not included in the base case. The licensee estimates that use of select seed for the regeneration of white spruce and lodgepole pine on the TFL is at least 15 years in the future.

The licensee presented two sensitivity analyses to examine the potential implications for timber supply from the use of select seed. In the first analysis it was assumed that 100 percent class "A" white spruce seed was used for reforestation of appropriate sites. This resulted in a 1.1-percent increase in timber supply across the entire forecast period. In the second analysis, it was assumed that class "A" lodgepole pine and hybrid spruce was used for reforestation of appropriate sites. This resulted in a 7.9-percent increase in timber supply across the entire forecast period. The licensee attributes the increases in timber supply projected in the sensitivity analyses to improvements in managed stand yields and decreases of 10 to 15 years in the MAI culmination ages modelled in the base case.

BCFS district staff have reviewed the information regarding the use of select seed and confirm that the information provided by the licensee reflects current practice on TFL 48.

Based upon my review of the information and my discussions with BCFS staff, I conclude that the base case assumptions regarding the use of select seed on TFL 48 adequately reflect current practice and are suitable for use in this determination.

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

Timber harvesting

I have reviewed the information regarding the utilization standards and the decay, waste and breakage factors assumed in the analysis for TFL 48, and I am satisfied that these factors were appropriately modelled in the base case. As a result, I will not discuss my considerations in this rationale.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production,

Integrated resource management objectives

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

I have reviewed the information regarding cutblock adjacency/green-up, recreation resources, and water resources assumed in the analysis for TFL 48, and I am satisfied that these factors were appropriately modelled in the base case.

- visually sensitive areas

Careful management of scenic areas visible from communities, public use areas, and travel corridors is an important forest management objective. The Forest Practices Code enables the management of visual resources by providing for scenic areas to be identified and made known, and by providing for the establishment of visual quality objectives (VQOs) that guide the management practices on a scenic area. To achieve this, visual landscape inventories are carried out to identify, classify, and record visually sensitive areas. On completion of such an inventory, a specialist may derive recommended visual quality objectives (RVQOs) of preservation, retention, partial retention, modification or maximum modification to identify levels of alteration that would be appropriate for particular areas. Visually sensitive areas can be identified by the district manager or in a higher level plan, and can be made known to licensees. The district manager or a higher level plan may also establish VQOs or recommended visual quality classes (RVQCs) to manage and conserve the visual resources in the scenic areas.

A visual landscape inventory of TFL 48 was completed in 1994 and was approved by the BCFS regional manager in 1995. Scenic areas with VQOs were established for the TFL

by the BCFS district manager in 1997. As a result, 1.1 percent, 6.7 percent, and 5.9 percent of the timber harvesting land base consists of areas classified as retention, partial retention, and modification VQO, respectively.

During 1999/2000 the licensee completed an update of the visual landscape inventory for TFL 48 using the *Visual Landscape Inventory Procedures and Standards Manual*, (BCFS, May 1997). Recommended changes to scenic areas and VQOs, which are expected to decrease the size of the area classified as retention or partial retention, have not yet been formally established by the BCFS district manager. Therefore, the base case for TFL 48 used the established scenic areas and VQOs, which were based on the 1994 visual landscape inventory.

To manage for visual quality, constraints are placed on timber harvesting, road building, and other forest practices. The constraints, which are based on experience, research findings, and public preferences, are expressed in terms of forest cover requirements that relate to the maximum percentage of a viewshed that may be harvested at any one time, and to 'visually effective green-up' (VEG)—the stage at which a stand of reforested timber is perceived by the public to be satisfactorily greened-up from a visual standpoint.

In the base case, the VEG height and the area-weighted average maximum percentage denudation applied to each VQO were: 5 metres and 21.9 percent in areas with a modification VQO; 5 metres and 9.9 percent in areas with a partial retention VQO; and 6 metres and 1.6 percent in areas with a retention VQO.

In order to test the sensitivity of the base case to changes in assumptions for visually sensitive areas the licensee prepared a number of sensitivity analyses. One analysis, which was based upon the 1994 visual inventory, tested the effect of decreasing the VQO category by one class for each visually sensitive area. This resulted in a 3.4 percent increase in the coniferous timber supply relative to the base case and a 1 percent increase in the deciduous timber supply relative to the base case. Decreasing the VQO category by one class for each visually sensitive area resulted in a 7 percent decrease in the coniferous timber supply and a 0.9 percent decrease in the deciduous timber supply.

Incorporating the results of the 1999/2000 visual inventory instead of the 1994 visual inventory resulted in 2 percent increase in the short-term coniferous timber supply and a 1.6 percent increase in the long-term coniferous timber supply. These changes also result in an increase in the deciduous timber supply to 54 300 cubic metres per year (2.5 percent) compared to the base case.

I have reviewed and discussed the information regarding visually sensitive areas with BCFS district staff. For this determination, I conclude that current practices for visually sensitive areas were appropriately modelled in the base case. If the district manager establishes new scenic areas and/or VQOs, these changes can be incorporated in the timber supply analysis.

- cultural heritage resources

Cultural heritage resources generally include archaeological and traditional use sites. Archaeological sites contain physical evidence of past human activity, whereas traditional use sites may not necessarily contain historical physical evidence but may indicate current use by a First Nation. To help manage for unrecorded archaeological sites, archaeological

overview mapping may be conducted to assign high, moderate or low ratings for archaeological potential within an area.

In 1999, the licensee obtained GIS information from an archaeological overview assessment (AOA) from the Archaeology Branch of the Ministry of Small Business, Tourism, and Culture. On the basis of this information, the licensee mapped the location of 20 known cultural heritage sites on TFL 48. Six of these sites occur within the newly established protected areas, while up to 6 other sites are expected to occur in riparian management areas. According to the licensee, it has completed over 50 archaeological impact assessments (AIAs) for forest roads and cutblocks since 1995. To date Canfor indicates that no heritage resources have been found during these surveys.

In the base case, after allowing for land base exclusions to account for other factors, buffering each of 20 known locations with a one-hectare reserve zone resulted in the further exclusion of 11 hectares from the timber harvesting land base.

According to the licensee, regional archaeological staff indicate that a heritage trail is believed to cross TFL 48. The location of the trail remains unknown; therefore, it was not incorporated in the base case assumptions. I note that if further information on this trail becomes available, it can be addressed within the context of operational plans.

In 1997, the Twin Sisters' Special Management Zone committee recommended that the area surrounding the Klin-se-za protected area provide opportunities for industrial development. This recommendation, and others made by the committee, were appended to the DCLRMP.

The West Moberly First Nation has since clarified their interpretation of the original committee recommendation, and believe that the area immediately surrounding the protected area should be considered a "no development area". Discussions between the West Moberly First Nation and other stakeholders regarding this issue are ongoing. Therefore, the area of the Twin Sisters RMZ, which includes 7653 hectares of stands that contribute to the timber harvesting land base, was included in the land base assumed in the base case.

Based upon my review of the information, I conclude that the assumptions regarding cultural heritage resources are appropriate for use in this determination. I note that the licensee participates in consultations with First Nations at an operational level to ensure that cultural heritage sites and First Nations issues are considered and addressed appropriately. Any changes in management in Twin Sisters' Special Management Zone can be incorporated in the next timber supply analysis for TFL 48.

- riparian habitat

Riparian habitats occur along streams and around lakes and wetlands. The Forest Practices Code requires the establishment of riparian reserve zones (RRZs) that exclude timber harvesting, and riparian management zones (RMZs) that restrict timber harvesting in order to protect riparian and aquatic habitats. For each stream, lake or wetland, the RRZ and RMZ make up the entire riparian management area. Stream riparian classes are described in the *Riparian Management Area Guidebook* and are determined based on presence of fish, occurrence in a community watershed, and average channel-width

criteria. The stream class is used to estimate the area required to be retained in the RRZ and the area or volume to be managed as the RMZ.

I have reviewed and discussed the information regarding riparian areas associated with lakes and wetlands with BCFS staff and I am satisfied that this factor was appropriately reflected in the base case.

According to Canfor, it has conducted fish and fish habitat inventories for TFL 48, which are based upon BCFS Resources Inventory Committee standards. For this analysis, the licensee sampled an area of the TFL that it believed had stream conditions and fish populations that were representative of riparian areas throughout the TFL. Based upon this sampling the licensee determined the area-weighted average RRZ for each of the classified streams within the sample area.

A stream classification tool, which was calibrated using the sampling data, was used to predict stream class throughout the TFL. RRZs were applied to the streams classified using the classification tool and the guidelines outlined in the *Operational Planning Regulations* of the Forest Practices Code. RMZs were also applied on the basis of the licensee's silvicultural prescriptions. This approach led to the exclusion of 26 266 hectares, after accounting for other factors, from the timber harvesting land base.

BCFS district staff expressed concern that the values obtained from the licensee's silvicultural prescriptions, upon which the licensee based its riparian retention estimates, were for proposed cutblocks only. They believe that these silvicultural prescriptions are not necessarily indicative of current performance; however, the district staff have no empirical information to support this viewpoint.

I have reviewed and discussed the information regarding riparian habitat with BCFS staff and I note that the area excluded from the timber harvesting land base appears to be relatively high; however, there is no empirical information to substantiate this conclusion. Therefore, I accept that the base case was based upon the best available information and is adequate for use in this determination. For the next determination I encourage BCFS district staff and the licensee to clarify this issue.

- wildlife habitat

3) identified wildlife

For wildlife species considered to be at risk, the Conservation Data Centre of British Columbia maintains tracking lists for each forest district. Each list names the species and plant associations considered to be at risk (e.g., endangered, threatened, vulnerable or sensitive) and which are known to occur, strongly expected to occur, or which have occurred in the past within a given forest district. The Identified Wildlife Management Strategy (IWMS) addresses habitat management for specific species considered to be at risk, as described in the next section.

Wildlife potentially occurring within or adjacent to TFL 48 include numerous *identified wildlife* species. These include mountain goat, grizzly bear, fisher, western grebe, American bittern, trumpeter swan, northern goshawk, short-eared owl, and bull trout.

Identified wildlife refers to species at risk (red- and blue-listed) as well as regionally significant species that are potentially affected by forest management activities and that may not have been adequately accounted for through existing management strategies. While the biodiversity and riparian provisions of the Forest Practices Code are intended to provide for the needs of most wildlife species, some species that are considered to be "at risk" require special management practices. The Province's *Identified Wildlife Management Strategy* (IWMS)—released in February 1999—provides mechanisms for managing critical habitat for identified wildlife species including Wildlife Habitat Areas (WHAs), General Wildlife Measures (GWMs) and higher level plan recommendations.

An active northern goshawk nest was found within an area of ungulate winter range in block 4 of TFL 48. At the time of the timber supply analysis, a WHA had not been established and the licensee did not include goshawk management assumptions in the base case.

The exact location or precise amount of WHAs that will be required within the timber harvesting land base to implement the IWMS has not yet been established. However, I note that government has limited the impact of management for identified wildlife in the short term to a maximum of one percent of the harvest level for the province. Given the Province's commitment to implementing the IWMS, and given the policy decisions and projected one-percent impact—and noting the occurrence of northern goshawk and the occurrence of other identified wildlife within TFL 48—I find it necessary and appropriate to account for an expected but not fully quantified impact on the timber supply of TFL 48. I therefore conclude that timber supply may be up to one percent lower than projected in the base case and have considered this in 'Reasons for decision'.

As the Province implements its strategy for the management of species at risk, I expect the specific implications to be reflected in future timber supply analyses for TFL 48 and these will be taken into account in future AAC determinations.

4) ungulate winter range

The licensee in conjunction with MWLAP and BCFS staff identified 8150 hectares within TFL 48 as potential ungulate winter range. For TFL 48, ungulate winter ranges have not yet been established and there has been no grand-parenting of areas previously classified as environmentally sensitive.

In its timber supply analysis, Canfor did not specifically exclude areas identified as potential ungulate winter range from the timber harvesting land base, as it believed that these areas were accounted for through old growth retention objectives, wildlife tree patches, riparian reserves, and operability constraints (e.g. the largest area of potential ungulate winter range overlaps with areas that have been classified as inoperable in block 1). BCFS and MWLAP staff have reviewed the ungulate winter range assumptions used in the analysis and agree with the licensee's approach.

I have reviewed and discussed the information regarding ungulate winter range with BCFS and MWLAP staff and I note that there are no legally established ungulate winter ranges on TFL 48. Therefore, I accept the ungulate winter range assumptions used in the base case. Any ungulate winter ranges that may be established on the TFL can be considered at the next determination.

5) grizzly bear habitat

Of the timber harvesting land base assumed in the base case for TFL 48, 83 097 hectares or approximately 26 percent, have been identified as potential grizzly bear habitat. Based upon the recommendations of the regional wildlife specialist, the licensee used the recommended intermediate early seral targets from the *Biodiversity Guidebook* to model forest cover objectives for these areas. These guidelines—which require that no more than 22 to 36 percent of the productive area be covered in stands less than 40 years of age— were applied to stands in the wetter areas in natural disturbance types (NDTs) 1 and 2. This forest cover objective was applied in order to ensure a stable supply of early seral forest (i.e., berry-producing shrubs) on the TFL.

MWLAP and BCFS district staff have reviewed the assumptions regarding grizzly bear management. District staff note that while the guidebook includes recommendations regarding the management of NDT 1 and 2 for grizzly bear habitat, these areas have not been officially established on the TFL, either through a higher level plan order or through the establishment of WHAs. However, district staff note that the licensee is managing these areas as recommended in the guidebook.

BCFS staff reviewing the base case indicated that timber supply was only constrained within two areas consisting of 4824 hectares and 290 hectares of timber harvesting land base within the Highhat and Wolverine draft landscape units, respectively. These areas represent 1.6 percent of the timber harvesting land base; therefore, the impact on timber supply resulting from grizzly bear habitat forest cover objectives is minimal.

In conclusion, I am aware that grizzly bear habitat has not been established officially through either a higher level plan order or through the designation of WHAs. However, I am satisfied with the BCFS district staff's confirmation that the licensee is currently managing for grizzly bear habitat in NDT 1 and 2 stands on TFL 48, as recommended in the *Biodiversity Guidebook*. Furthermore, I note that forest cover objectives for grizzly bear habitat had a minimal impact on the base case timber supply. Therefore, I accept the assumptions regarding grizzly bear habitat as adequate for use in this determination.

- landscape-level biodiversity

Biodiversity is defined as the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems and the evolutionary and functional processes that link them. Under the Forest Practices Code, biodiversity in a given management unit is assessed and managed at both the landscape and stand levels.

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species that are dependent on or are strongly associated with old-growth forests. Although some general forest management practices can broadly accommodate the needs of most ecosystems, more often a variety of practices are needed

to represent the different natural disturbance patterns under which ecosystems have evolved.

The delineation and formal designation of 'landscape units' is a key component of a sub-regional biodiversity management strategy. A landscape unit is an area established by the district manager, generally up to 100 000 hectares in size, based on topographic or geographic features such as a watershed, or series of watersheds, to manage biodiversity and other forest resource values.

The *Biodiversity Guidebook*, the *Landscape Unit Planning Guide* and *Higher Level Plans: Policy and Procedures* all provide policy and guidance on management for landscape-level biodiversity. The *Landscape Unit Planning Guide* provides guidance on which components of the full range of recommendations included in the *Biodiversity Guidebook* should be implemented to achieve a balance of forest management objectives. The *Landscape Unit Planning Guide* contains forest cover constraints for old seral forest that are recommended for application at the biogeoclimatic variant level within each landscape unit. The recommendations are stated as a minimum percentage of the productive forest to be retained in stands above a specified age that varies by ecosystem type. The guide also allows the old seral requirement to be phased in over time in landscape units with a lower biodiversity emphasis.

The 1996 Higher Level Plans: Policy and Procedures guide provides further policy guidance. It outlines three biodiversity emphasis options (BEOs)—lower, intermediate and higher—that may be employed when establishing biodiversity management objectives for a landscape unit. To achieve a balance between biodiversity and timber supply objectives, this guide recommends the application of a mix of BEOs in each subregional planning area. The proportions of a planning area subject to lower and intermediate biodiversity emphasis should range from 30 to 55 percent, with the average at approximately 45 percent of the area subject to lower, 45 percent to intermediate, and 10 percent to a higher BEO (45-45-10).

TFL 48 falls within the Boucher, Burnt-Lemoray, Carbon, Dunlevy, East Pine, Gething, Highhat, Martin Creek, and Wolverine draft landscape units and draft BEOs were assigned for each landscape unit. The boundaries of the draft landscape units were amended in December 2000 to coincide with the TFL 48 boundaries. Because these draft BEOs have not been formally established, in the base case the licensee modelled the provincial distribution of 45-45-10 to calculate the percentages of the land base in each variant that needed to be retained in old seral forest over time.

The licensee incorporated four key assumptions in the base case. First, the 45-45-10 distribution for the draft landscape units was assumed to be met solely within the boundaries of TFL 48. Second, designated protected areas were assumed to contribute to forest cover objectives within their respective draft landscape units. Third, old-growth retention was phased in over three rotations in landscape units with a lower BEO. And fourth, only old seral stage retention constraints were employed. That is, the base case did not model the retention of minimum amounts of "mature plus old" forest. BCFS staff have reviewed the assumptions used in the base case and indicate that the licensee used standard procedures for modelling landscape level biodiversity.

The licensee provided three sensitivity analyses that tested the impact of altering the landscape-level biodiversity assumptions on the base case timber supply. In the first analysis, applying the full old seral stage requirements in areas with lower BEOs immediately, rather than phasing them in over three rotations resulted in a 1.7 percent increase in the initial coniferous timber supply. In the second analysis, applying the draft BEOs for each landscape unit increased the initial coniferous timber supply level by 1.4 percent to 535 900 cubic metres per year, while mid- and long-term coniferous timber supply remained virtually unchanged. In the third analysis, applying the full old and mature plus old seral stage requirements resulted in a 1.4-percent increase in the initial coniferous timber supply.

While there was no impact on the deciduous harvest forecast resulting from application of the draft BEO constraints, applying mature plus old seral targets and applying the full old seral targets immediately both resulted in a 0.6 percent increase in deciduous supply compared to the base case.

I have reviewed the information regarding management for landscape-level biodiversity on TFL 48 and conclude that the assumptions incorporated in the base case are based on standard procedures and are appropriate for use in this determination. If BEOs are established during the term of MP No. 3 they can be accounted for in the next determination.

- stand-level biodiversity

Stand-level biodiversity is managed by retaining reserves of mature timber, or wildlife tree patches (WTPs), within cutblocks and in adjacent inoperable and other retained areas to provide structural diversity and wildlife habitat. The *Landscape Unit Planning Guide* outlines procedures and makes recommendations on the proportion of a cutblock that is required in wildlife tree retention.

The licensee conducted a spatial review of wildlife tree patches in the TFL and found that 55 percent of WTPs were located within the timber harvesting land base and 45 percent were outside of the timber harvesting land base. For this analysis, the licensee followed the standard procedures outlined in the *Landscape Unit Planning Guide* and the results of the WTP review to derive an incremental reduction of 4.4 percent for harvested stands within the timber harvesting land base and 3.6 percent for harvested stands outside of the timber harvesting land base.

In order to mimic the harvesting of wildlife tree patches within the model, the licensee assumed that double the percentage calculated for the timber harvesting land base would be managed using a forest cover requirement requiring 50 % of the area to be covered with stands exceeding a specified age (180 years for spruce and balsam, 160 years for pine and 110 years for deciduous).

I am satisfied that the assumptions used in the base case for stand level biodiversity are based on local information, reflect current practice and are appropriate for use in this determination. I encourage the licensee to continue to monitor actual wildlife tree retention on TFL 48 for the next determination.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

Other Information

With respect to the base case harvest profile and sequencing assumptions, I have considered the information and am satisfied that these assumptions were appropriate. As a result, I will not discuss my considerations in detail in this document.

Dawson Creek Land and Resource Management Plan

Strategic plans establish the broader context for operational plans by providing objectives for managing forest resources in a given area. There are several types of planning processes which are described as strategic in relation to operational planning processes. Distinction must be made between higher level plans as defined by the Forest Practices Code and strategic land use planning processes such as regional or subregional planning (land and resource management planning). Portions of plans arising from strategic planning processes may be declared as higher level plans under the Forest Practices Code. A higher level plan defined under the Forest Practices Code establishes government's social, economic and environmental objectives, thereby setting the resource management context for developing subsequent operational plans.

Land and resource management planning is an integrated sub-regional planning process involving significant public participation. Completed and approved plans establish direction for land use and specify broad resource management objectives and strategies for the plan area. The objectives defined through the LRMP process can reach higher level plan status under the Forest Practices Code if officially declared as such by government, but do not have to be designated in this manner in order to influence resource management.

The Dawson Creek Land and Resource Management Plant (DCLRMP) encompasses the Dawson Creek Forest District, including TFL 48. The DCLRMP, which was approved by government in March 1999, includes recommendations for land use, protected areas, and the management of visual quality, wildlife habitat and riparian values over the area the plan encompasses.

I am aware that current practices on TFL 48 are guided by the recommendations of the DCLRMP.

Twenty-year plan

The harvest level used in the twenty-year plan was based upon the harvest level projected in the base case. The initial 5-year period of the TYP included the blocks identified in the current forest development plan. BCFS district staff have reviewed the twenty-year plan submitted by the licensee and are satisfied that the harvest level proposed in the base case can be achieved for a period of 20 years.

The district manager accepted the licensee's twenty-year plan on July 23, 2001.

I have reviewed and discussed the information regarding the TYP with BCFS staff and I am satisfied that the first two decades of the base case harvest projection is operationally obtainable, although not necessarily in the precise locations indicated in the TYP. I have

been mindful of this information in my consideration of an appropriate harvest level for TFL 48.

(b) the short and long-term implications to British Columbia of alternative rates of timber harvesting from the area,

Alternative rates of harvest

- harvest flow/socio-economic implications

The nature of the transition from harvesting old growth forests to harvesting second growth forests is a major consideration in determining AACs in many parts of the province. In the short term, the presence of large timber volumes in older forests often permits harvesting above long-term levels without jeopardizing future timber supply. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been and continue to be determined to ensure that current and mid-term harvest levels will be compatible with a smooth transition toward the usually (but not always) lower long-term harvest level. Thus, timber supply should remain sufficiently stable so that there will be no inordinately adverse impacts on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are not required to maintain forest productivity and future harvest stability.

Canfor provided two alternative harvest flows that examined the effect of increasing the deciduous harvest levels relative to the base case. In the first of these alternatives, increasing the deciduous harvest level by 20 percent for 20 years followed by two 10-percent decrements had no effect on either the short- or mid-term timber supply; however, the long-term harvest level fluctuated slightly after 250 years. In the second forecast, increasing the deciduous harvest level by 10 percent for 30 years had no impact on the timber supply projected in the base case.

In a separate analysis provided by the licensee, not allowing deciduous trees to age beyond 150 years led to a large decline in the deciduous timber supply in decade 10 of the forecast that persisted until decade 15. According to the licensee, the projected flat-line deciduous harvest level that is attainable when deciduous tree age was limited to 150 years was 37 500 cubic metres per year.

Canfor also provided two alternative harvest flows that examined the effect of increasing the coniferous harvest levels relative to the base case. In the first of these alternatives, increasing the coniferous harvest level by 20 percent for 20 years, followed by maximum declines of 10 percent per decade resulted in a mid-term harvest level 2 percent and a long-term harvest level 0.5 percent below the levels projected in the base case. In the second forecast, increasing the coniferous harvest level by 30 percent for 10 years with a 10-percent per decade decline to the long-term harvest level projected in the base case resulted in a mid-term harvest level 2.3 percent lower than the base case.

I have reviewed the alternative rates of harvest modelled by the licensee and I note that it is possible to harvest significantly more volume than indicated in the base case. I am also

aware of the sensitivity of the deciduous harvest level to changes in age assumptions for deciduous stands. I have taken this information into consideration in my determination, as discussed in my "Reasons for decision".

- community dependence upon the forest industry

Canfor owns and operates a large sawmill in Chetwynd employing approximately 220 people. Approximately 57 percent of the wood volume processed in this mill comes from TFL 48. The other large mill located in Chetwynd, which is owned and operated by West Fraser Mills Ltd., employs approximately 200 to 250 people; however, it processes wood fibre from sources outside of TFL 48.

Louisiana-Pacific owns and operates a chemi-thermal mechanical pulp (CTMP) mill in Chetwynd, which employs about 175 people. Currently this mill utilizes an average of 25 000 cubic metres per year of the deciduous volume harvested on TFL 48.

I have reviewed and discussed the information regarding community dependence on the forest industry with BCFS staff and I am aware that the community of Chetwynd is highly dependent upon the forest industry for employment.

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

Timber processing facilities

Timber processing facilities in the Dawson Creek Forest District, including Canfor's Chetwynd sawmill , process approximately 1.9 million cubic metres of wood per year. Approximately 57 percent of the 700 000 cubic metres per year of wood processed at Canfor's Chetwynd mill comes from TFL 48. Recently the licensee has invested 9 million dollars on upgrades to this mill in order to increase lumber recovery, particularly of smaller diameter wood.

Louisiana-Pacific's OSB mill in Dawson Creek utilizes timber from its deciduous PAs and private sources. In addition, Louisiana-Pacific is constructing a new veneer plant in Dawson Creek that will process wood from a 600 000 cubic metre per year deciduous Forest Licence on the Dawson Creek TSA.

Louisiana-Pacific's Chetwynd pulp mill in Chetwynd has an annual processing capacity of approximately 525 000 cubic metres of aspen and cottonwood of which approximately 25 000 cubic metres per year of deciduous wood comes from TFL 48. The balance comes largely from the licensee's private land and non-Crown sources. This licensee also owns and operates an oriented strand board (OSB) plant in Dawson Creek and is building a veneer plant. As a result, this licensee is interested in accessing the full 54 000 cubic metres per year attributable to deciduous-leading stands on TFL 48.

I have reviewed the information regarding timber-processing facilities and I note that the local capacity for milling deciduous volumes is increasing. In my experience milling capacity generally tracks behind the available timber supply.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia,

Economic and social objectives

- Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4). These economic and social objectives are an important consideration in my determination of the AAC for TFL 10.

The letter and memorandum include objectives for forest stewardship, a stable timber supply, and a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his 1994 letter, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

The Minister's 1996 memorandum addressed the effects of visual resource management on timber supply. It asked that pre-Code constraints applied to timber supply in order to meet VQOs be re-examined when determining AACs in order to ensure they do not unnecessarily restrict timber supply.

I have considered the contents of the letter and memorandum in my determination of the AAC for TFL 48. I note that commercial thinning is not occurring to any significant extent on TFL 48, and that the licensee has not indicated any plans to undertake any commercial thinning in its proposed MP No. 3. However, Canfor has been converting the marginal agricultural land, immature deciduous stands, and previously logged coniferous sites on the Rice properties to productive conifer-leading stands (see *Rice properties*).

In addition, as discussed under *deciduous stands*, I conclude that there are opportunities to harvest deciduous-leading stands that are located outside of the area of PA 13, as these stands have similar characteristics to deciduous stands within the area covered by PA 13 that are currently being harvested and will discuss this further in my "Reasons for decision'.

In any case, the Minister's direction relates primarily to managing a declining timber supply. In the case of TFL 48, the timber supply is more likely to rise over time than to decline. Hence the potential for commercial thinning and the impacts of visual quality management are not particularly significant in this determination.

- local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives.

According to the licensee, it provided opportunities for public review of the draft MP No. 3 and the timber supply analysis, including:

- Public Advisory Committee meetings held in early 2000 for Canadian Standards Association forest certification;
- advertising open houses in local and regional newspapers;
- distributing information by mail to municipal councils, First Nations groups, community organizations, and government agencies; and,
- holding an open house on September 21, 2000, and making the documents available for public viewing.

The licensee indicates that it received one comment concerning the draft MP No. 3 and it did not require any revisions to the document.

I am satisfied that the licensee has carried out its public involvement obligations satisfactorily, and that no specific issues were identified in public review which would impact this determination.

First Nations

TFL 48 falls within the area identified under Treaty Eight. Both the West Moberly and Salteau First Nations are signatories to this treaty and have reserves that are directly adjacent to the TFL. Recently, the McLeod Lake Indian Band also agreed to adhere to Treaty Eight. In addition the Lheidl T'enneh of Prince George have asserted traditional use and are involved in the BC Treaty Commission process.

Canfor indicates in its proposed MP No. 3 that it actively participates in consultations with First Nations on resource-related issues. In addition, the standard Ministry of Forests consultation policies will apply to operational planning, as outlined in the Ministry of Forests Policy on Aboriginal Rights and Title, and associated Consultation Guidelines.

I acknowledge Canfor's commitment to continue its participation in consultations with First Nations as part of regular operations and am not aware of any specific concerns affecting timber supply. Should future studies or discussions with First Nations groups provide new information, any impacts will be reflected in future determinations to the extent that they may affect timber supply.

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Non-Recoverable Losses

Numerous parasites, fungi or plants can kill trees or degrade the quality and value of logs. Unsalvaged losses are timber volumes destroyed or damaged by agents such as fire and disease, that are not recovered through salvage operations.

Estimates for unsalvaged losses account for epidemic infestations that are not incorporated into yield estimates used in the analysis. Timber volume losses due to insects and diseases that normally affect stands (endemic losses) are accounted for in inventory sampling for existing timber yield estimation or through other methods. Losses associated with second-growth stands are addressed by application of operational adjustment factors.

Canfor estimated an annual combined loss of coniferous and deciduous volumes of 56 146 cubic metres per year due primarily to fire, and also to insects and disease, windthrow, and other natural causes. BCFS district staff indicate that this is a reasonable estimate based on the apparent long-term history. However, losses to fire should be significantly lower as roads are extended throughout the TFL area. Indeed, losses to fire have been significantly lower over the past ten years compared to the long-term estimate used in the base case.

I have reviewed and discussed the information regarding non-recoverable losses with BCFS staff and I accept that the base case estimates are based upon the best available information and are acceptable for use in this determination.

Reasons for Decision

I have considered the information discussed throughout this document, and I have reasoned as follows.

For the reasons stated in 'Timber Supply Analysis' and from reviewing the considerations as recorded above, I accept the licensee's base case as an adequate basis from which to assess timber supply for this AAC determination. I note in particular that it is a reasonable reflection of the Dawson Creek Land and Resource Management Plan.

Although Phase 2 of the vegetation resources inventory has yet to be completed, I note that the best available information indicates that existing mature stands could support the initial base case rate of harvest for about 100 years. I note also that the anticipated average cutting age will be about 175 years over that period. As a starting point, this indicates that the timber supply is very robust, and therefore any significant risk is a fairly long-term matter.

In determining this AAC, I have identified factors which, considered separately, indicate that the timber supply may be either greater or less than that projected in the base case. Generally some of these factors can be quantified and their impacts assessed with some reliability. Others may influence timber supply by adding an element of risk or

uncertainty to the decision but cannot be reliably quantified at this time. I have accounted for these latter factors in my determination in more general terms.

In this rationale, I have identified several factors for which I believe the base case assumptions differ from current operational practices or conditions. These factors are summarized below.

For this determination, I have identified one factor that I believe will decrease timber supply compared to the base case projection:

- *identified wildlife management strategy* – I concluded that the eventual establishment of WHAs and other measures to manage for identified wildlife will result in a decrease of up to one percent in timber supply over the forecast period.

For this determination, there are three factors that I believe will act to increase timber supply compared to the base case projection:

- *Peace/Boudreau proposed protected area* – At this time I cannot assume that this proposed protected area will be designated as a protected area. Therefore, I concluded that the timber harvesting land base assumed in the base case has been underestimated by 2099 hectares and this results in a small increase (less than 1 percent) in the long-term timber supply.
- *deciduous stands outside of the area of PA 13* – I reasoned that stands outside the area of PA 13 that are similar to deciduous stands within the boundaries of PA 13, and that are not subject to site-specific constraints, should also contribute to timber supply. Therefore, I concluded that the timber supply of deciduous species has been underestimated in the base case by 4900 cubic metres per year across the entire forecast period.
- *site productivity estimates* – Based on OGSI adjustments applied in a sensitivity analysis and their effect on timber supply, I have concluded that future yields of regenerating stands and hence long-term timber supply may be significantly greater than projected in the base case.

I note that because the base case is a flat-line harvest projection, the harvest flows chosen by the licensee to depict the sensitivity of the timber supply to changed assumptions were also flat-line projections. Hence all of the four listed factors affected the entire forecast period. Furthermore, based upon my review of the alternative harvest forecasts prepared by the licensee I conclude that timber supply for TFL 48 is robust and should support a higher harvest level than was projected in the base case.

Of the four factors listed above, site productivity adjustments have the largest impact on the timber supply projected in the base case. However, I am aware that the modelled adjustments were based upon the results of provincial studies rather than localized site productivity studies and that the exact magnitude of site productivity adjustments for this TFL are still uncertain. I am also aware that no one will know for some years how much impact the strip shelterwood method of harvest may have on long-term productivity compared to the better-known influence of clearcut harvesting.

I am aware that there is still some uncertainty regarding the eventual effect that completion of landscape unit planning and the establishment of wildlife habitat areas for

ungulate winter range and grizzly bears, as well as the identified wildlife species known to occur on or near TFL 48 will have on timber supply.

I am also aware of the uncertainty surrounding the level of stand denudation and productivity loss that may occur as a result of the increasing level of energy exploration and development in this part of the province.

I am mindful of several issues concerning the utilization of deciduous species:

- As mentioned above, I note that deciduous-leading stands outside of the areas covered by PA 13 are similar to stands within PA 13. Unless there are site-specific constraints, I see no reason why they should not be assumed to contribute to the timber supply.
- Furthermore, I am concerned about that many deciduous-leading stands were not harvested in the base case until they were more than 120 years old. Given that more than 14,000 hectares of such stands are already more than 100 years old, I am concerned that they may naturally degenerate significantly before the harvest ages projected in the base case.
- While I am aware that the low site indices assumed in the base case for deciduous stands may have led to an underestimation of the deciduous timber supply, I am also mindful of the alternative harvest forecast in which deciduous stands were assumed to die at age 150 years and the reduction in the resultant mid-term timber supply.
- Finally, I am aware that the level of harvesting deciduous-leading stands has been only about half of the volume of the partition specified in the last AAC determination. However, I am optimistic that the demand for deciduous timber will rise if and when the new veneer plant in Dawson Creek and the planned OSB in Fort St. John begin production.

In order to encourage the harvesting of mature deciduous stands I will continue and slightly increase the partition in the AAC for deciduous and coniferous volume attributable to deciduous-leading stands.

Determination

I have considered and reviewed all the factors documented above, including the risks and uncertainties of the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, and that reflects current management practices as well as the socio-economic objectives of the Crown, can best be achieved by establishing an AAC of 580 000 cubic metres. Under section 8(5) of the *Forest Act*, I attribute 55 000 cubic metres to deciduous and coniferous trees within deciduous- leading stands, and the balance to coniferous and deciduous trees within coniferous-leading stands.

This determination is effective September 20, 2001 and will remain in effect until a new AAC is determined, which must take place within five years of the date of this determination.

If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner than the five years required by legislation.

Implementation

In the period following this determination and leading to the subsequent determination, I request that the licensee:

- complete Phase 2 of the vegetation resources inventory;
- classify areas within the TFL that do not currently have an inventory label;
- monitor harvesting performance in deciduous-leading stands which are currently classified as having low timber growing potential;
- document the success of stand conversion activities being conducted on the Rice properties;
- obtain localized site productivity information;
- monitor the productivity of regenerating and advanced regeneration stands in areas managed under the irregular shelterwood silvicultural system;
- document actual wildlife tree patch retention; and
- track and quantify the area of forested land on the TFL that is denuded as a result of energy exploration and development activities.

In the period following this determination and leading to the subsequent determination, I request that the licensee in conjunction with BCFS staff:

- confirm the actual management practices in riparian management areas; and
- confirm the area of not-satisfactorily-restocked land.

Ken Baker.

Ken Baker
Deputy Chief Forester
September 20, 2001

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, reads as follows:

Allowable annual cut

8. (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and

(b) different types of timber and terrain in different parts of private land within a tree farm licence area.

(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, in accordance with

(a) the community forest agreement, and

(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

(iii) silviculture treatments to be applied to the area,

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

   (a) encourage maximum productivity of the forest and range resources in British Columbia;
   (b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;
   (c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;
   (d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and
   (e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996

File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

Province of
British Columbia

Minister of
Forests

Parliament Buildings
Victoria, British Columbia
V8V 1X4

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia
Ministry of Forests
OFFICE OF THE MINISTER

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: The Crown's Economic And Social Objectives Regarding Visual Resources

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

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In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis*.

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests